24378

Method of S/142/60/003/005/005/015
E192/E382

ASSOCIATION: Kafedra elektrovakuumnoy tekhniki Taganrogskogo radiotekhnicheskogo instituta (Chair of Electrovacuum Technology of Taganrog Radio-technical Institute)

SUBMITTED: October 12, 1959 (initially)
November 16, 1959 (after revision)

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21581

S/109/60/005/010/004/031
E033/E415

9,4210

AUTHOR: Malyshev, V.A.

TITLE: On the Theory of the Magnetron Oscillator

PERIODICAL: Radiotekhnika i elektronika, 1960, Vol.5, No.10, pp.1603-1613

TEXT: There is considerable difficulty in deriving a mathematical description of magnetron behaviour but, nevertheless, development of a complete theory of the magnetron oscillator is a real requirement. V.N.Shevchik's theory of "cascade grouping" (Ref.1) was an advance but his expressions for the electron conductance took the form of finite sums and, although it was possible to find from them a number of the oscillator parameters, nevertheless a full analysis could not be made. In this article an attempt is made, by simplifying Shevchik's formulae, to obtain a theory for the magnetron (for small amplitudes) similar in type to the theory developed by S.D.Gvozdover for the reflex klystron (Ref.2). The article is in four sections: 1) derivation of an expression for the electron admittance; 2) obtaining of an expression for the electron inter-action coefficient; 3) analysis of the electron admittance expression to find the regions of

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oscillations; 4) analysis of the oscillator operation. The results obtained may be used for evaluating the effect of various specific factors on the output parameters (power, frequency). Shevchik showed that in an N-segment magnetron where each electron of the stream interacts with m slots, the real and reactive components of the first harmonic of current induced in the gap of each segment is determined by the expression

$$i_a = 2\frac{I_0}{N} M \sum_{2}^{m} J_1(C_k X_{01}) \sin[(k-1)(\Theta_0 - \alpha) - D_k],$$

$$i_r = 2\frac{I_0}{N} M \sum_{2}^{m} J_1(C_k X_{01}) \cos[(k-1)(\Theta_0 - \alpha) - D_k], \qquad (1)$$

where M is the electron inter-action coefficient; $\Theta_0 = \omega l / v_0$ is the mean flight angle between cavities (l is the distance between the gap centres, v_0 is the undisturbed electron velocity, ω is the frequency); α is the phase change between oscillations in neighbouring resonators ($\alpha = n(2\pi/N)$ where

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n is the mode number of the oscillation: for the π-mode, $\alpha = \pi$);
I_o is the magnetron anode current. Also

$$C_k = \sqrt{A_k^2 + B_k^2}; \quad D_k = \operatorname{arc\,tg} \frac{B_k}{A_k}; \tag{2}$$

$$A_k = \sum_{n=0}^{k-2} (k-n-1) \cos n (\Theta_0 - \alpha); \quad B_k = \sum_{n=0}^{k-2} (k-n-1) \sin n (\Theta_0 - \alpha). \tag{3}$$

X_{o1} is the grouping parameter in the space between the gaps.

$$X_{o1} = \frac{M\Theta_o}{2U_o} U \tag{4}$$

where U_o is the potential which determines the undisturbed electron velocity; U is the a.c. voltage amplitude in the gap. The space charge is taken into account by multiplying the kinematic grouping parameter (Eq.(4)) by the factor

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$$P = \frac{\sin \frac{l\omega_p}{v_0}}{\frac{l\omega_p}{v_0}}, \tag{5}$$

where ω_0 is the plasma frequency determined by

$$\omega_p = \sqrt{\left|4\pi \frac{e}{m} \rho_0\right|} = 1,83 \cdot 10^{10} \sqrt{\frac{I_0}{NF\sqrt{U_0}}} \tag{6}$$

F is the cross-sectional area of the stream (F = h, where h is the height of the block). The magnetron electron admittance Y_e is given by NY_{el} where

$$Y_{el} = \frac{I_0 M^2 \Theta_0 P L}{U_0 N \tau^2} \frac{J_1(AU)}{AU} e^{-j(\delta+\pi)}, \tag{12}$$

in which

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$$\delta = \tau - \frac{3\pi}{2} - \operatorname{arc\,tg} \frac{2\cos z\tau + (z+1)\tau \sin z\tau - z\tau^2 - 2}{2\sin z\tau - (z+1)\tau\cos z\tau + \tau(1-z)},$$

$$L = \tau \sqrt{2(z+1)^2 + (z\tau)^2 + \frac{8}{\tau^2} - 2z\left[\frac{4}{\tau} + \tau(z+1)\right]\sin z\tau - 2\left[\frac{4}{\tau^2} + 2z + 1 - z^2\right]\cos z\tau}, \qquad (12a)$$

$$A = \frac{M\Theta_0 PB}{2U_0} = \frac{M\Theta_0 P}{2U_0}\sqrt{\frac{z^2}{4} + \left[(2+z) + \frac{2}{\tau^2}\right]\left(1 - \cos\frac{z\tau}{2}\right) - \frac{z}{\tau}\sin\frac{z\tau}{2}}, \qquad (12b)$$

(12B)

and $z = m - 2$; δ is the phase of the electron admittance; $\tau = \Theta_0 - \alpha$ is the parameter characterizing the flight angle; P is the space charge parameter. To obtain an expression for M, the electron inter-action coefficient, two effects are considered: 1) the effect of inhomogeneity of the electric field in the direction of the electron movement and 2) the fact that the electron is acted upon by only a portion of the a.c. voltage in the gap (i.e. by the field at the edges of the gap). A rectilinear electrode configuration is assumed. The phase of the electron admittance is analysed to find the oscillation regions for various

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values of m and graphs of $L/\tau^2 = f(\tau)$ and $B = f(\tau)$ are constructed. Finally, the oscillator operation is analysed by representing the oscillator system of the magnetron by an equivalent parallel resonant circuit. There are 7 figures and 8 Soviet references.

SUBMITTED: December 14, 1959

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MALYSHEV, V. A., Cand Phys-Math Sci -- "Solution of certain problems of the theory of oscillations for narrow-band generators of ultra-high frequencies." Taganrog, 1961. (Min of Higher and Sec Spec Ed RSFSR. Saratov Order of Labor Red Banner State U im N. G. Chernyshevskiy) (KL, 8-61, 1927)

34258
S/142/61/004/005/001/014
E192/E382

9.3260 (1139, 1159)

AUTHOR: Malyshev, V.A.

TITLE: Influence of a small sinusoidal signal on a narrow-band oscillatory system with delayed feedback

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Radiotekhnika, v. 4, no. 5, 1961, 513 - 534

TEXT: The problem of the influence of a harmonic signal on a narrow-band oscillatory system with an arbitrary phase of the negative admittance is of some practical interest. Here, this problem is solved by the method of slowly-changing amplitudes. For the purpose of analysis, it is assumed that the frequency of the external signal is near to the frequency of the free oscillations of the system and that the amplitude of the signal is small. The equivalent circuit of the system can therefore be represented as shown in Fig. 1a, where the parameters R, L and C characterize the oscillatory circuit of the system; R_i is the internal resistance of the oscillator $N\ni$ is the nonlinear element of the oscillator and the

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current $i_H = f_o(U)$, where U is the voltage across the linear element. By assuming that $i = i_o + i_H$ and $i_o R_i = U + E_o^2 \cos t$, the system is described by the following equation:

$$\frac{d^2U}{d\tau^2} + U = hU - \frac{1}{Q}\frac{dU}{d\tau} + E \sin \tau - \frac{1}{C\omega_o}\frac{di_H}{d\tau} \quad (1)$$

where $\tau = \omega t$, $h = 1 - \omega_o^2/\omega^2 \simeq 2\Delta\omega/\omega_o$, Q is the quality factor of the resonance circuit, $\omega_o^2 LC = 1$, $Q_B = \omega_o CR_i$ is the quality factor of the resonance circuit with load and $E_o = ER_i C\omega \simeq EQ_B$, $Q = C\omega_o RR_i/(R = R_i) \simeq C\omega RR_i/(R + R_i)$.
Since the righthand-side portion of Eq. (1) is smaller than each of the terms in the lefthand-side portion, the solution of Eq. (1) is in the form of:

$$U = A(\tau)\cos[(\tau - \Theta(\tau)] = A \cos \alpha \quad (2)$$

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where $A(\tau)$ and $\Theta(\tau)$ are slowly changing functions of time. It is shown that the simplified equations for A and Θ are in the form

$$\frac{dA}{d\tau} = -\frac{1}{2\pi}\int_0^{2\pi}\left[hA\cos\alpha + \frac{1}{Q}A\sin\alpha + E\sin(\alpha+\Theta)\right]\sin\alpha d\alpha + \frac{1}{2\pi C\omega_0}\int_0^{2\pi}\frac{dI_H}{d\tau}\sin\alpha d\alpha;$$

$$\frac{d\Theta}{d\tau} = \frac{1}{2\pi A}\int_0^{2\pi}\left[hA\cos\alpha + \frac{1}{Q}A\sin\alpha + E\sin(\alpha+\Theta)\right]\cos\alpha\cdot d\alpha - \frac{1}{2\pi C\omega_0 A}\int_0^{2\pi}\frac{dI_H}{d\tau}\cos\alpha d\alpha. \quad (3)$$

where F is the amplitude of the first current harmonic, which is, in general, dependent not only on A but also on the frequency ω; δ is the phase difference between the first harmonic of the current i_H and voltage U and the angle π (δ is often referred to as the phase or the negative admittance of the oscillator). In general, the quantities F and δ can be determined by the method indicated in Ref.7 (Izv. vuzov SSSR - Radiotekhnika, 1960, v.3, no.5, 474) by using:

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$$F(A)e^{-j(\delta+\pi)} = \frac{2j}{T}\int_0^T e^{-j\omega t} f_0(A\sin\omega t)\,dt.$$

It is also shown (Ref.6 - I.M.Kapchinskiy - Methods of the theory of oscillations in radio-engineering - Gosenergoizdat, 1954) that the conditions of stable operation of the system at the frequency ω are determined by

$$P = -\left(\frac{\partial\Phi}{\partial A} + \frac{\partial\Psi}{\partial\Theta}\right) > 0; \quad q = \left(\frac{\partial\Phi}{\partial A}\cdot\frac{\partial\Psi}{\partial\Theta} - \frac{\partial\Phi}{\partial\Theta}\cdot\frac{\partial\Psi}{\partial A}\right) > 0. \qquad (6)$$

The above expressions are employed to investigate the general case of the oscillators with weak excitation, in which $\delta \neq f/(A)$, $\delta \neq f(\omega)$, and $F \neq f(\omega)$. The formulae derived are then used to study the pull-in of a vacuum-tube oscillator and that of UHF oscillators. The case of under-excited oscillators (regenerative amplifiers) of the vacuum-tube and UHF types is also considered. The expressions derived for these systems were verified experimentally, in particular for UHF generators (reflex klystrons). From the analysis and experimentsl results, it was found that as the negative-admittance phase δ increased

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from 0 to 100°, the frequency bandwidth between the half-power points of the output signal increased monotonically. As regards the regenerative and negative-feedback operation of the system, the amplitude monotonically decreased as the phase of the negative admittance varied from the value corresponding to the transition conditions to $\delta = 180°$. When δ changes from 0 to 180°, the regions of instability undergo considerable changes; in particular, in the pull-in and negative-feedback regimes two regions of instability and 3 different types of unstable points are encountered; when the operating conditions correspond to the transition from regeneration to pull-in, the maximum output signal increases and the bandwidth becomes reduced as δ changes from 0 to 90°. In vacuum-tube oscillators the highest gain in the regenerative system can be obtained for values of δ 60°, when an unstable region occurs within the amplification bandwidth. One of the important problems in the operation of a regenerative amplifier is the gain stability. The experiments show that stable operation of a reflex klystron amplifier can be achieved by employing the usual electronic stabilizers and that a stable gain of 20 db can be obtained.

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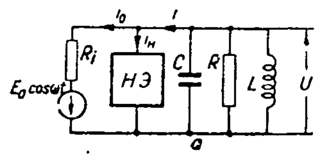
There are 11 figures and 18 references: 17 Soviet-bloc and 1 non-Soviet-bloc. The English-language reference mentioned is: Ref. 18 - M. Chodorow and V. Westburg - PIRE, 1951, 39, no. 12, 1548.

ASSOCIATION: Kafedra obshchey fiziki Rostovskogo-na-Donu gos. universiteta (Department of General Physics of Rostov-on-Don State University)

SUBMITTED: May 11, 1960

Fig. 1a:



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21044

S/109/61/006/003/003/018
E140/E135

9.4230 (also 1532)

AUTHORS: Malyshev, V.A., and Mikhalevskiy, V.S.

TITLE: On the Theory of the TWT-Oscillator With Weak Feedback

PERIODICAL: Radiotekhnika i elektronika, 1961, Vol.6, No.3, pp. 363-370

TEXT: In previous work the problem of the title has been treated only qualitatively. The present article attempts to derive certain features of operation of such oscillators using the cinematic approximation. The detailed mechanism for realization of feedback is not considered, it being assumed only that the feedback factor for a given space harmonic is much less than unity and independent of the generated frequency which must be close to one of the natural frequencies of the system. These conditions are best realized in oscillators with external feedback; in oscillators with internal feedback they can be satisfied only under the condition of negligibly small interaction of the modulated electron stream with the reflected wave. These conditions are not satisfied in reflex TWT. The delay system is considered in the form of a simple resonator with natural frequencies fairly closely

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On the Theory of the TWT-Oscillator With Weak Feedback

spaced. It is assumed that measures have been adopted on the device for separation of the natural frequencies, for example by the use of a special filter in the feedback circuit, or by the use of systems with normal dispersion. This assumption permits neglect of the possibility of oscillation at several neighbouring frequencies. Finally, the analysis takes into account interaction of the flow only with a single definite space harmonic of the wave, uniquely defined by the phase velocity in the system. The analysis proceeds from the equation of motion of the electron, from which the Kepler's equation for the transit angle of the electron has been found by V.N. Shevchik (Ref.10):

$$\varphi = \varphi_0 - \frac{\mu e^{\frac{\gamma v_0 \varphi}{\omega}}}{\rho\left(1 + \frac{\gamma^2}{\theta^2}\right)} \sin\left(\omega t - \frac{v_0}{v_\Phi}\varphi - \psi\right), \qquad (3)$$

where:

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$$\operatorname{tg}\psi = \frac{1-\frac{\gamma^2}{\theta^2}}{2\frac{\gamma}{\theta}}; \quad \theta = \frac{\omega}{v_0}\rho = \frac{\omega}{v_0}\left(1-\frac{v_0}{v_\Phi}\right); \quad \mu = \frac{\varepsilon E_1}{m v_0 \omega\left(1-\frac{v_0}{v_\Phi}\right)}; \tag{4}$$

$$\varphi = \omega t - \omega\tau; \; \varphi_0 = \frac{\omega x}{v_0},$$

where: τ - time of electron entry into the system; γ - propagation constant; ε - the electron charge; v_Φ - the phase velocity of the wave; v_0 - the velocity of the undisturbed electron. Examining further the interactions taking place in the system, an equivalent circuit is found (no diagram given) in the form of a parallel combination of L, C, G and G_1 elements, where G_1 represents the load losses and G the device losses. Then the electron stream represents a conductance for which there is given the expression

X

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On the Theory of the TWT-Oscillator With Weak Feedback

$$Y_e = 2G_0 \frac{1 - J_0(X)}{X^2} e^{-j(\delta+\pi)} = G_e + jB_e,$$

where

$$G_0 = \frac{9\varepsilon\omega I_0}{\gamma m M^2 v_0^3 (\theta^2 + \gamma^2)} = pI_0; \quad X = \frac{3\varepsilon\omega U}{m M v_\Phi v_0^2 (\theta^2 + \gamma^2)} = rU; \qquad (10)$$

$$\delta = \psi - \pi = \operatorname{arc\,tg} \frac{\theta^2 - \gamma^2}{2\gamma\theta} - \pi.$$

where X is the bunching parameter. Based on these relations the author then analyzes the operation of the oscillator, determining the output power and frequency of oscillation. In particular the question of electronic tuning is considered and an approximate expression found for the whole range of $\Delta\omega_p$

$$\Delta\omega_p = \frac{\sqrt{1 - 4N^2 v_0^2 \gamma^2}}{N\left|\left(B\omega_0 v_\Phi + \frac{\gamma}{\beta_0}\right)\right|}; \qquad \beta_0 = \frac{\omega_0}{v_\Phi}, \qquad (24)$$

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where v_o and v_Φ are taken at the centre of the band. The electronic tuning range $\Delta\omega_p$ obtained experimentally is usually small because of the great value of the parameter B in the usual delay system. To broaden the range it is recommended to design the oscillator to satisfy the conditions

$$\left(\frac{\partial v_\Phi}{\partial \omega}\right)_0 = -\frac{4Q_H \gamma v_\Phi^2 \left(1 - \frac{1}{2Q_H}\right)^2}{\omega_0^2 \left(2 - \frac{1}{Q_H}\right)} \simeq -\frac{2Q_H \gamma v_\Phi^2}{\omega_0^2} = -\frac{Q_H \gamma \lambda^2}{2\pi^2}\left(\frac{v_\Phi}{c}\right)^2, \qquad (21)$$

where γ and c - wave length and speed of light in the free space. Finally optimal loading for a given value of X

$$\frac{J_1(X)}{X} = \frac{G}{G_o \cos\delta}; \qquad \frac{1}{X}\left[2\frac{1 - J_o(X)}{X} - J_1(X)\right] = \frac{G_H}{G_o \cos\delta} \qquad (26)$$

The oscillator efficiency, time of establishment and load characteristics are also discussed. The authors' conclusion

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that a system with normal dispersion leads to stable wide-band operation contradicts the conclusion of E. Jones (Proc. I.R.E., 1952, 40, 4, 478) (Ref.1) and M. Denis (Ann. radioèlectr., 1952, 7, 29, 169) (Ref.2), that systems with anomalous dispersion should be superior. This is due to the fact that these authors in their analysis completely ignored the reactance of the electron stream. The present work is in accordance with experimental results and is analogous in character to well-established formulae in the theory of the reflex klystron.
There are 3 figures and 14 references: 10 Soviet and 4 non-Soviet.

SUBMITTED: June 27, 1960

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22898

S/109/61/006/004/012/025
E140/E135

9,2585

AUTHOR: Malyshev, V.A.

TITLE: On the theory of ..ode microwave oscillators

PERIODICAL: Radiotekhnika i elektronika, Vol.6, No.4, 1961, pp. 604-612

TEXT: Analysis of retarding-field diode oscillators shows that they have no substantial advantages over reflex klystrons, either in regard to the range of electronic tuning or maximum efficiency. An increase in the rate of electronic tuning (by a factor of 1.42) is balanced by a commensurate deterioration in the frequency stability. The obtained results show that the operation of diode oscillators is generally similar to the operation of reflex klystrons and that all the types of diode oscillators considered in the paper can be studied and calculated in the same way. The output parameters of diodes with a retarding field may be close to the values observed in analogous reflex klystrons. The analysis given in this paper confirms experimental results published by C.J. Carter, W.H. Cornett and

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On the theory of diode microwave oscillators

M.O. Thurston (Ref.7: Vide, 1956, Vol.12, 65, 281).
There are 4 figures and 10 references: 6 Soviet, 3 English and 1 translation from English into Russian.

SUBMITTED: February 15, 1960

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MALYSHEV, V.A.

Concerning the article "Theory of a magnetron generator." Radiotekh.i elektron. 6 no.6:1030 Je '61. (MIRA 14:6)
(Magnetrons)

S/057/61/031/002/007/015
B020/B067

26.2358

AUTHOR: Malyshev, V. A.

TITLE: Kinetics of the pumping of vacuum systems in quasisteady state

PERIODICAL: Zhurnal tekhnicheskoy fiziki, v. 31, no. 2, 1961, 200-203

TEXT: The published theoretical data on the pressure change with time in an evacuated vacuum system are based on the assumption that the rate of evacuation of the pump is independent of pressure but depends on the quasisteady state during the evacuation. The effective rate of evacuation in a real vacuum system depends, however, on the pressure in the system. Taking account of this dependence the kinetics of the evacuation process in the real vacuum systems can be determined more exactly. The present paper deals with this problem. All conditions are assumed to be fulfilled which are necessary to attain the quasisteady state. S_p and S are the effective rates of evacuation of the pump and the vacuum system, S_p' and S' the actual rates of evacuation of the pump, p_1 is the initial pressure in

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the vacuum system and simultaneously also the pressure in the exhaust tube of the pump and p_o the limiting pressure attained by means of the pump. The limiting pressure is explained by a backflow of the gas from the pump into the system. In mechanic pumps this backflow has the same character as the passage of a gas through a small opening whose permeability K is independent of pressure. The backflow $K(p_1-p')$ increases with decreasing pressure. The resulting gas flow is given by $S_p p' = S'_p p' - K(p_1 - p')$, where p' denotes the pressure at the suction tube of the pump, if $p' = p_1$, $S_p = S'_p$, with $p' = p_o$, however, $S_p = 0$ and

$$S'_p = K(p_1 - p_o/p_o);\ Kp_1 = p_o(S'_p + K) \qquad (1)$$

and with $C = S'_p + K = K^{p_1/p_o}$ the author obtains $S_p = C(1-p_o/p')$ (2)

The relation obtained between the pressures at the ends of the tubes is

$$p - p_0 = \frac{C+U}{U}(p' - p_0); \qquad (5)$$

from which

$$p - p' = \frac{C}{U}(p' - p_0). \qquad (6)$$

is obtained as the dependence of the pressure drop at the ends of the tubes on pressure p' at the pump. Equation (6) does not hold in the region of the initial pressures. This is explained by the fact that the flow along the tube is not constant and the conditions are quasisteady. The pressure region $p_1-p_2 = (C/C+U)(p_1-p_0)$ at the suction tube of the pump is the region of quasisteady conditions for the ideal case of an infinitely large volume (V) of the sucked-off object. The general dependence of the pressure difference at the ends of the tube on pressure p' is shown in the Fig.

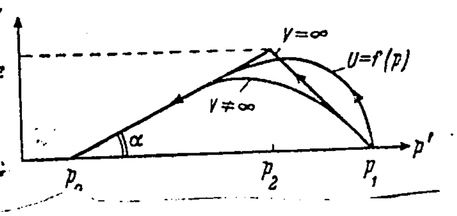

Abb.

(the direction of the change of function p-p' = f(p') with time being indicated by arrows). The relations obtained can be practically applied. Equation (6) indicates that in the absence of negative sources pressure drop at the ends of the tube becomes zero. This is an advantageous criterion when examining the tightness of the system. Practical experiments were made with a vapor-oil pressure pump CДН -1 (SDN-1) in a pressure region in which the conditions of evacuation can be regarded as steady, whereas the conditions of air flow are molecular. The evacuation kinetics are determined by equation (8)

$$p - p_0 = (p_1 - p_0)\, e^{-\frac{C'}{V}t}$$

taking account of the backflow into the object, where V is the volume of the sucked-off object. There are 1 figure and 3 Soviet-bloc references.

ASSOCIATION: Taganrogskiy radiotekhnicheskiy institut (Taganrog Radiotechnical Institute)

SUBMITTED: October 16, 1959

S/141/62/005/001/013/024
E203/E435

9.4110

AUTHOR: Malyshev, V.A.

TITLE: Theory of plate diode with a uniform cathode under saturation conditions

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Radiofizika. v.5, no.1, 1962, 128-135

TEXT: This paper was presented at the Conference of MV and SSO SSSR on Radioelectronics, Khar'kov, 1961 and at the 7th Scientific-Technical Conference of the Taganrog Radioengineering Institute.
A quantitative evaluation is made of the effect of the space charge on the current-voltage characteristic of a plate diode (without spots and non-uniformities) a d the consequent deviation from Schottky's law. From energy considerations the author derives formulae for a correction coefficient γ in respect of the nonuniformity of the field between the electrodes and for a dimensionless parameter C depending on the work function of the cathode material, the distance between the electrodes and the temperature. A few actual values of C are quoted for the more

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common cathode materials. The following conclusions are drawn. The space charge influence can only be neglected at such high anode potentials which often cannot be realized in practice or demand power dissipation beyond the anode's capability. Under more usual conditions practical errors result, for instance an extrapolation of the current-voltage curve down to zero field values will always result in too low a figure for emission current density. Richardson's method for determining emissivity and work function will give values too low for both. The author then gives a detailed method of solving the problem graphically, obtaining near approximations to actual conditions. The calculations having been based on the assumption of a uniform smooth cathode, two criteria arise to test this assumption. The experimental and theoretical values of C must coincide; the slope of the current-voltage characteristic must follow the "three halves power law". It is claimed that non fulfilment of these criteria gives a measure of the non-uniformity of the cathode. The author points out that errors arise due to finite dimensions of the diode and that these errors will increase,

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Theory of plate diode ... S/141/62/005/001/013/024
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decreasing diode dimensions and increasing current density.
There are 3 figures and 2 tables.

ASSOCIATION: Taganrogskiy radiotekhnicheskiy institut
(Taganrog Radioengineering Institute)

SUBMITTED: April 15, 1961

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S/057/62/032/003/014/019
B139/B102

26238

AUTHOR: Malyshev, V. A.

TITLE: Effect of sorption on kinetics of evacuation of vacuum systems

PERIODICAL: Zhurnal tekhnicheskoy fiziki, v. 32, no. 3, 1962, 360-364

TEXT: The author develops the kinetic equation of the evacuation of vacuum systems for quasi-steady conditions in the light of a sorption which proceeds proportionally to pressure, and analyzes the effect of sorption on the evacuation parameters. If the sorption isotherm satisfies Henry's law, it follows that $\left(\frac{dn}{dt}\right)_g = \beta\left[\frac{f(p)}{\nu} - n\right]$, where n is the molecular concentration on the walls, $\left(\frac{dn}{dt}\right)_g$ describes the diffusion through the walls, β is a definite coefficient, f(p) is the adsorption per unit area, ν is the evaporation probability of a surface molecule per unit time. Desorption is characterized by the relation

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B139/B102

Effect of sorption on kinetics...

$\left(\frac{dn}{dt}\right)_u = -\left(\frac{dn}{dt}\right)_a = \nu n - ap$. Hence the gas afflux to the system per second $\frac{dQ}{dt} = kTq(\nu n - ap)$ where q is the wall area of the system. The pressure ratio is given by

$$\ddot{x} + 2\rho\dot{x} + \omega_o^2 x = 0 \qquad (13)$$

where $x = p - p_f$; $\rho = \frac{\gamma}{2V}(C + kTqa) + \frac{\nu + \beta}{2}$; $\omega_o^2 = \frac{C\gamma\nu}{V}\left[1 + \frac{\beta}{\nu}\right]$ (14)

Since $\rho^2 > \omega_o^2$ is satisfied in any case and the conditions at the onset of evacuation always guarantee the inequalities $x_o > 0$; $-\dot{x}_o > (\rho + \sqrt{\rho^2 - \omega_o^2})x_o$ (17) the solution of (13) represents a monotonically decreasing function. The dependence $-\ln \frac{p - p_f}{p_{in} - p_f} = f(t)$ is represented by a straight line of the slope $\frac{C\gamma}{V}$ toward the time axis (dashed line in Fig. 1); in the case of large t, the slope may come up to $\rho - \sigma$ (full line in Fig. 1). Owing to

Card 2/3

Effect of sorption on kinetics... S/057/62/032/003/014/019
B139/B102

sorption, the slope of the curve indicated by the full line toward the dashed curve decreases during evacuation thus indicating decreasing evacuation rate. Sorption is most distinct at small time constants $\frac{V}{\gamma C}$ and low temperatures. There are 2 figures and 5 references: 3 Soviet and 2 non-Soviet.

ASSOCIATION: Taganrogskiy radiotekhnicheskiy institut (Taganrog Institute of Radio Engineering)

SUBMITTED: April 17, 1961

Card 3/3

S/057/62/032/012/011/017
B104/B186

AUTHOR: Malyshev, V. A.

TITLE: Symmetrical stationary problem of isothermic gas diffusion

PERIODICAL: Zhurnal tekhnicheskoy fiziki, v. 32, no. 12, 1962, 1482-1483

TEXT: The stationary solution of the total differential equations

$$D_0 \nabla^2 (\ln \nu) = \frac{\partial \nu}{\partial t}, \quad (4)$$

$$D_0 = \nu D = \frac{2T}{3\pi\sigma^2 (T + C)} \sqrt{\frac{kT}{\pi m}}. \quad (5)$$

describing the isothermic diffusion of a single-component gas is studied.

$$D = \frac{1}{3} v\lambda; \quad v = \sqrt{\frac{8kT}{\pi m}}; \quad \lambda = \frac{1}{\sqrt{2}\, \pi\sigma^2 \nu (1 + \frac{C}{T})} \quad (3)$$

holds for the diffusion coefficient, where m is the mass of the molecule,

Card 1/3

C the Sutherland constant, σ the diameter of the molecule, ν the concentration. If the boundary conditions are $\nu|_{x=x_1} = \nu_1$ and $\nu|_{x=x_2} = \nu_2$ and the diffusion is one-dimensional the stationary solution of (4) can be written in the form

$$\nu = \nu_1^{\frac{x_2-x}{x_2-x_1}} \nu_2^{\frac{x-x_1}{x_2-x_1}}. \qquad (6).$$

For the gas flow through the unit cross-section

$$Q = -D_0 \frac{d(\ln \nu)}{dx} = \frac{D_0}{x_2 - x_1} \ln \frac{\nu_1}{\nu_2}. \qquad (7)$$

is given. If Q is known, one of the boundary conditions can be found. The stationary solution of (4) with axially symmetrical diffusion can be given in the form

$$\nu = \left(\nu_1^{\ln \frac{r}{r_2}} \nu_2^{\ln \frac{r_1}{r}}\right)^{\frac{1}{\ln \frac{r_1}{r_2}}}, \qquad (8)$$

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if the boundary conditions are $v|_{r=r_1} = v_1$ and if $v|_{r=r_2} = v_2$. The gas flow through a cylindrical surface of unit length is obtained from

$$Q = -D_0 2\pi r \frac{d(\ln v)}{dr} = 2\pi D_0 \frac{\ln \frac{v_1}{v_2}}{\ln \frac{r_2}{r_1}}. \qquad (9).$$

The solution of (4) for a stationary central-symmetrical diffusion takes the form

$$v = \left[v_1^{R_1(R_2-R)} v_2^{R_2(R-R_1)}\right]^{\frac{1}{R(R_2-R_1)}}, \qquad (10)$$

subject also to

$$Q = -4\pi R^2 D_0 \frac{d(\ln v)}{dR} = \frac{4\pi D_0 R_1 R_2}{R_2 - R_1} \ln \frac{v_1}{v_2}. \qquad (11)$$

if the boundary conditions are analogous as above.

ASSOCIATION: Taganrogskiy radiotekhnicheskiy institut (Taganrog Radio Engineering Institute)

SUBMITTED: March 20, 1962 (initially)
June 26, 1962 (after revision)

APPROVED FOR RELEASE: 06/20/2000 CIA-RDP86-00513R001032010002-2"

L 16211-63 EWT(1)/BDS AFFTC/ASD

ACCESSION NR: AR3005176 S/0058/63/000/006/H027/H027

SOURCE: RZh. Fizika, Abs. 6 Zh170

51

AUTHOR: Maly*shev, V. A.

[redacted]

TITLE: Principles of calculation of the coupling of a resonator and a transmission line

CITED SOURCE: Sb. Vopr. elektroniki i elektrodinamiki sverkhvy*sokikh chastot, Taganrog, 1962, 50-60

TOPIC TAGS: coupling loop, round loop, square loop, resonator coupling, transmission line coupling

TRANSLATION: The parameters of a round and rectangular loop for the coupling of a resonator with a transmission line are calculated; the coupling is assumed to be inductive. Assuming the parameters of the resonator and of the transmission line and the resonant-circuit efficiency specified, the main parameters of the coupling loop are calculated. The use of the theory developed is illustrated with specific examples wherein a round and a rectangular loop are designed for a transmission line for the 10 cm band. Yu. Pirogov.

DATE ACQ: 15Jul63 SUB CODE: GE, SP ENCL: 00

Card 1/1

S/139/63/000/001/022/027
E202/E420

AUTHORS: Zavadovskaya, E.P., Lazebnikov, Yu.Ye., Malyshev, V.A.

TITLE: Experimental checking of the theory of frequency characteristics of photoresistors and luminophors

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Fizika, no.1, 1963, 142-146

TEXT: The authors developed apparatus to check the two formulas

$$\frac{\Phi}{\Phi_0} = \frac{1-e^{-\frac{1}{y}}}{1+e^{-\frac{1}{y}}}; \quad y = 2\tau f; \tag{4}$$

$$\frac{\sigma}{\sigma_0} = \frac{\operatorname{th}\frac{1}{x}}{1+x\operatorname{th}\frac{1}{x}}; \quad x = \frac{2f}{\sqrt{N\alpha}}. \tag{5}$$

where Φ and Φ_o are the luminescence pulse amplitudes at a

Card 1/3

S/139/63/000/001/022/027
Experimental checking ... E202/E420

frequency f and zero frequency respectively; τ - lifetime of an electron in an excited state, f - frequency of the square wave pulses irradiating the luminophor, N - rate of generation of the current carriers per unit volume due to the irradiation, α - probability of recombination of the current carrier in a unit volume with one of the recombination centers; σ and σ_0 - amplitudes of the photoconductive pulses, σ_0 corresponding to the zero frequency of irradiation. Eq.(4) was checked for the case of cathode luminescence of $Zn_2SiO_4 \cdot Mn$ which has exponentially decaying luminescence. Cathode luminescence was studied in a 6E5C (6Ye5S) tube which was incorporated in a circuit containing a square wave pulse generator and a photoelement CЦB (STsV) with an oscilloscope. Values of τ measured at a frequency of 10 cs were $(1.14 \pm 0.01) \cdot 10^{-2}$ sec. It was shown that with the coefficient of filling $\gamma = 0.5$, the decrease of frequency did not increase the amplitude of the luminescence, hence knowing τ and Φ_0 it was possible to determine y and Φ/Φ_0 for each measured value of frequency. A graphical comparison showed good agreement between the experimental and theoretical results of luminescence
Card 2/3

frequency characteristics. Eq.(5) was checked for the case of the photoconductivity of CdS, using as samples industrial photoresistors type ФС-К1 (FS-K1) and ФС-К1 (FS-K2). Experiments showed that the photo-characteristics of these photoresistors were substantially linear within the whole range of values of the light flux N when plotted as $i_Ф = f(\sqrt{N})$. The light beam from a small lamp was modulated mechanically and produced a well defined square wave form. Comparison of the theoretical frequency characteristics with experimental data gave close agreement when σ/σ_1 was plotted against $f(x)$. At low frequencies the experimental points fell below the theoretical curve. This was attributed to the effect of the electron traps in CdS affecting the recombination processes. Hence in the determination of the magnitude of $\sqrt{N\alpha}$ a frequency was chosen at which $\sigma/\sigma_o = 0.2$. There are 4 figures.

ASSOCIATION: Taganrogskiy radiotekhnicheskiy institut
(Taganrog Radiotechnical Institute)

SUBMITTED: January 3, 1962

MALYSHEV, V.A.

Almost invariant measures. Vest. Mosk. un. Ser. 1: Mat., mekh. 19 no.6:48-50 N-D '64 (MIRA 18:2)

1. Kafedra teorii funktsii i funktsional'nogo analiza Moskovskogo universiteta.

ALEKSANDROV, Nikita Mikhaylovich, kand. med. nauk; KLEMENTOV, Anatoliy Vasil'yevich, kand. med. nauk; MALYSHEV, Vasiliy Alekseyevich, kand. med. nauk; FEDOROVSKAYA, N.V., red.

[Emergency stomatological aid] Neotlozhnaia stomatologicheskaia pomoshch'. Leningrad, Meditsina, 1965. 110 p. (MIRA 18:6)

MALYSHEV, V.A.

Phenomenological theory of one-component diffusion. Izv. vys. ucheb. zav.; fiz. 8 no.2:70-72 '65. (MIRA 18:7)

1. Taganrogskiy radiotekhnicheskiy institut.

MALYSHEV, V.A.

Determination of the optimum load of single-stage self-oscillators. Izv. vys. ucheb. zav.; radiotekh. 8 no.3: 378-381 My-Je '65. (MIRA 18.9)

MALYSHEV, V.A.

The law of corresponding states for the temperature dependence of steam pressure in a steam-saturated liquid. Izv. vys. ucheb. zav.; fiz. 8 no.4:147-150 '65. (MIRA 18:12)

1. Taganrogskiy radiotekhnicheskiy institut. Submitted January 29, 1965.

L 6439-66 EWT(1)/EWA(h)

ACC NR: AP5026193 SOURCE CODE: UR/0142/65/008/004/0411/0419

13
B

AUTHOR: Malyshev, V. A.

ORG: none

TITLE: Stabilizing the frequency of shf oscillators 25 by an external resonator connected via a half-wave line

SOURCE: IVUZ. Radiotekhnika, v. 8, no. 4, 1965, 411-419

TOPIC TAGS: shf oscillator, frequency stabilization

ABSTRACT: Full potentialities of the external-cavity method of shf-oscillator stabilization and the problem of loss of the oscillator power caused by its additional load are investigated in the present article which is an outgrowth of some earlier American works (M. Magid, IRE Nat'l Conv. Record, Mar 1957, 1, 208 and others). Frequency stabilization in a shf oscillator whose external cavity is connected via a transmission line of integer-half-waves length is theoretically considered. Formulas are developed for stabilization coefficients depending on the feedback delay and on the external reactive load. A new coefficient of stabilization

Card 1/2 UDC: 621.373.52

L 6439-66

ACC NR: AP5026193

efficiency is introduced; this coefficient takes into account the reduction of the oscillator output power caused by the external cavity. An experimental verification is mentioned which permits neglecting the resonant properties of the transmission line. Orig. art. has: 3 figures, 47 formulas, and 1 table.

SUB CODE: EC/ SUBM DATE: 25May64/ ORIG REF: 002/ OTH REF: 003

Card 2/2

L 10540-66

ACC NR: AP5022427 SOURCE CODE: UR/0109/65/010/009/1635/1645

36
B

AUTHOR: Malyshev, V. A.

ORG: none

TITLE: Approximation of the current-voltage characteristic of a tunnel diode by polynomials in a quasi-linear analysis of the diode operation

SOURCE: Radiotekhnika i elektronika, v. 10, no. 9, 1965, 1635-1645

TOPIC TAGS: tunnel diode, current voltage characteristic, electronic amplifier, electronic circuit, electronic oscillator

ABSTRACT: Heretofore, analytical approximations of tunnel-diode I-V characteristics have never permitted a simple and regorous examination of tunnel-diode circuits in a quasi-linear approximation. The present article attempts to solve this problem by representing the diode current as an exponential polynomial of voltages across the diode depletion layer. Formulas for

Card 1/2 UDC: 621.382.233.001

2

L 10540-66

ACC NR: AP5022427

approximating the I-V curve by general polynomials of the 3rd, 4th, 5th, and 6th degree are developed; an especially simple solution is obtained with the 6th degree polynomial. Also, formulas are derived for the oscillatory characteristic and the negative-resistance phase; these formulas are intended for analyzing the behavior of tunnel-diode oscillators and amplifiers in a quasi-linear approximation. An experimental verification of the formulas is claimed. Orig. art. has: 6 figures and 57 formulas.

SUB CODE: 09 / SUBM DATE: 26May64 / ORIG REF: 005 / OTH REF: 004

Card 2/2 pw

L 10395-66

ACC NR: AP5026901 SOURCE CODE: UR/0109/65/010/010/1814/1823

35

B

AUTHOR: Malyshev, V. A. 44,55

ORG: none

TITLE: Investigation of nonlinear characteristics of a complete equivalent circuit of the tunnel diode

SOURCE: Radiotekhnika i elektronika, v. 10, no. 10, 1965, 1814-1823

TOPIC TAGS: tunnel diode, semiconductor diode

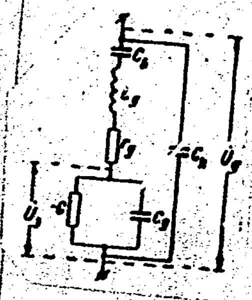
ABSTR : The connection between the parameters of the complete tunnel-diode equivaler circuit (see figure) and the nonlinear characteristics of an equivalent diode a-c admittance is investigated. The depletion-layer negative conductance is assumed to depend on the voltage amplitude A_d across the depletion layer as: $-G = -G_0(1 - vX_d^2)$; $X_d = A_d/u_2$, where u_2 is the valley voltage of the depletion-

Card 1/2 UDC: 621.382.233:539.2.012

2

L 10395-66

ACC NR: AP5026901



layer I-V characteristic, G_o and ϑ can be determined from the same characteristic. Formulas are developed which describe nonlinear properties of (negative) conductance and susceptance at the terminals of an a-c supplied tunnel diode. It is shown that only under strong-signal conditions has the diode a negative conductance which corresponds to a high negative conductance of the depletion layer. The existence of inductive and capacitive susceptances, in the negative-conductance region of the I-V curve, is explored. Orig. art. has: 8 figures and 33 formulas.

SUB CODE: 09 / SUBM DATE: 22Jun64 / ORIG REF: 004 / OTH REF: 003

JW

Card 2/2

L 27890-66

ACC NR: AP5026538

SOURCE CODE: UR/0286/65/000/019/0081/0081

AUTHORS: Kitayev, Yu. V.; Simagin, A. V.; Malyshev, V. A.

ORG: none

TITLE: A device for testing a diving respiratory apparatus. Class 42, No. 175262

SOURCE: Byulleten' izobreteniy i tovarnykh znakov, no. 19, 1965, 81

TOPIC TAGS: respirator, pressure regulator, automatic pressure control

ABSTRACT: This Author Certificate presents a device for testing a diving respiratory apparatus. The device contains a sensitive element in the form of a membrane dividing the casing into two compartments and directing the flow of a gas stream through a nozzle regulated by a measuring element (see Fig. 1). To broaden the limits of testing pressure without destroying the sensitive element, the nozzle-containing chamber of the device is provided with a valve and an auxiliary membrane which is equal to the effective size of the membrane and which directs the valve. The valve and the auxiliary membrane regulate the pressure delivered by a source of compressed air in response to the tested pressure.

Card 1/2

UDC: 626.025.001.4

L 27890-66

ACC NR: AP5026538

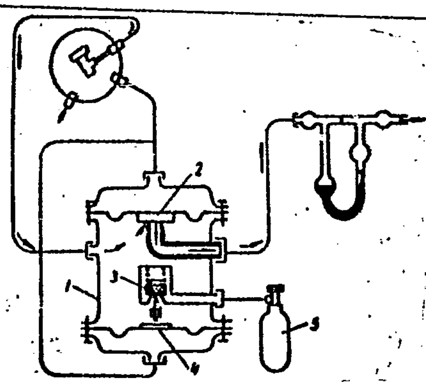


Fig. 1. 1- chamber; 2- nozzle; 3- valve; 4- membrane; 5- source of compressed air

Orig. art. has: 1 figure.

SUB CODE: IE/ SUBM DATE: 01Jul63

Card 2/2

KLOSS, B.M.; MALYSHEV, V.A.

Determining the complexity of some classes of functions.
Vest. Mosk. un. Ser. 1: Mat., mekh. 20 no.4:44-51 Jl-Ag '65.
(MIRA 18:9)

1. Kafedra teorii veroyatnosti Moskovskogo gosudarstvennogo Universiteta imeni M.V. Lomonosova.

MALYSHEV, V.A.

A.N.Kolmogorov's problem. Vest.Mosk.un.Ser.1: Mat., mekh. 20 no.6:8-10 N-D '65. (MIRA 18:12)

1. Kafedra matematicheskogo analiza Moskovskogo universiteta. Submitted Feb. 10, 1964.

L 36196-66 EWT(1)

ACC NR: AP6011451 SOURCE CODE: UR/0109/66/011/004/0699/0706

AUTHOR: Voloshchenko, Yu. P., Malyshev, V. A.

ORG: none

TITLE: Nonlinear theory of negative-conductance TW amplifiers

SOURCE: Radiotekhnika i elektronika, v. 11, no. 4, 1966, 699-706

TOPIC TAGS: TW amplifier, electronic amplifier, distributed amplifier, amplifier design

ABSTRACT: An attempt is made to construct a nonlinear theory of ... amplifiers operating under stationary conditions. Assumptions: ... amplifier is designed with nonlinear susceptances and negative nonlinear conductances, (b) no reflections in the amplifying system, (c) small ... length, i.e., the amplitude propagation constant is considerably smaller than ...

Card 1/2 UDC: 621.385.632.011.222

L 36196-66

ACC NR: AP6011451

phase constant. The method of successive approximations is used. [illegible] extended over the case of tunnel-diode TW amplifiers in the zeroth [illegible] approximations. Tunnel gaps with oscillatory characteristics are [illegible] which are associated with soft and hard excitation conditions. The results obtained for the tunnel-diode amplifier are also applicable to an extended (along the transmission line) reflex klystron that operates at a repeller voltage corresponding to the oscillation-zone center. Two Supplements give details of operation with two integrals used in the article. Orig. art. has: 2 figures and 76 formulas.

SUB CODE: 09 / SUBM DATE: 04Jan65 / ORIG REF: 002 / OTH REF: 003

Card 2/2 mcP

L 33393-66 EEC(k)-2/EWP(k)/EWT(1)/FBD/T IJP(c) WG

ACC NR: AP6011461 SOURCE CODE: UR/0109/66/011/004/0767/0769

AUTHOR: Malyshev, V. A. 42

ORG: none

TITLE: Quasilinear negative conductance of quantum devices

SOURCE: Radiotekhnika i elektronika, v. 11, no. 4, 1966, 767-769

TOPIC TAGS: quantum device, quantum generator

ABSTRACT: Formulas are given for the quasilinear negative conductance G_e of three- and four-level resonator-type quantum devices based on one transition. The conductance G_e in a quasilinear approximation is given by: $G_e = -G_0/(1+X^2)$; $X = Ar$. A table presents energy diagrams for three types of quantum systems, kinetic equations and their solutions, formulas for the parameters G_0 and r, and formulas for the output power. The case of purely conductive G_e (when the quantum frequency ν_{ij} exactly corresponds to the frequency of energy transition from the i-th level to the j-th) is considered. Orig. art. has: 9 formulas and 1 table.

SUB CODE: 10,09/ SUBM DATE: 03Dec64 / ORIG REF: 003 / OTH REF: 001

Card 1/1 UDC: 621.378.3.011.222

L 05673-67 EWT(d)/T IJP(c)
ACC NR: AR6023248

SOURCE CODE: UR/0044/66/000/003/V056/V056

AUTHOR: Malyshev, V. A.

37
B

REF SOURCE: Sb. Diskretn. analiz. Vyp. 5. Novosibirsk, 1965, 27-30

TITLE: On the possibility of calculating discrete functions within a certain probability

SOURCE: Ref. zh. Matematika, Abs. 3V200

TOPIC TAGS: control theory, mathematic analysis

TRANSLATION: The image of a set B_n of binary sequences of length n in B_m is called a discrete (n,m)-function. Let the control system $\mathfrak{A}$ compute some (n,m)-function ϕ. It is said that (n,m)-function f is p-computed by control system $\mathfrak{A}$ if the function f and ϕ coincide at least for $[p\cdot 2^n]$ values of the arguments $(0 < p < 1)$. Then schemes of functional elements are considered having two inputs and realizing all functions of two variables. By the complexity of a scheme is meant, as usual, the number of functional elements in it. By $L(f,p)$ is meant the least of the complexities of the schemes which p-compute function f. Let $L(n,m,p) = \max L(f,p)$, where the maximum is taken for all possible (n,m)-functions f. The following is proved: Theorem. If $m(n) \to +\infty$ and $\frac{\log_2 m(n)}{n} \to 0$, then $L(n,m,p) \sim \frac{p\cdot m(n)\cdot 2^n}{n}$.

Card 1/2

UDC: 519.95

L 05673-67

ACC NR: AR6023248

where for any $\varepsilon > 0$ the portion of the $(n, m(n))$-functions for which

$$L(f, p) < (1-\varepsilon)\cdot\frac{p\cdot m(n)\cdot 2^n}{n},$$

approaches zero with a growth n. V. Kudryavtsev.

SUB CODE: 12/ SUBM DATE: none

Card 2/2

APPROVED FOR RELEASE: 06/20/2000 CIA-RDP86-00513R001032010002-2"

MALYSHEV, V.A., NAZAROVA, Z.Ya.

Some data on anicteric leptospirosis in Chelyabinsk Province.
Zhur. mikrobiol., epid.i immun. 33 no.4:62-64 Ap '62.
(MIRA 15:10)

1. Iz Chelyabinskoy oblastnoy sanitarno-epidemiologicheskoy stantsii.

(CHELYABINSK PROVINCE---LEPTOSPIROSIS)

MALYSHEV, V.A. (Gor'kovskaya oblast')

Treatment of tuberculosis with small doses of phthivazide. Probl. tub. no.2:68-69 Mr-Ap '54. (MLRA 7:5)
(NICOTINIC ACID ISOMERS, therapeutic use,
*isoniazid in pulm. tuberc., small doses)
(TUBERCULOSIS, PULMONARY, therapy,
*isoniazid, small doses)

USSR/ Chemistry - Chemical engineering; Industrial Economics FD-2720

Card 1/1 Pub. 50 - 1/20

Author : Malyshev, V. A.

Title : Concerning the methods to be used in the calculation of the production capacity of chemical industry enterprises

Periodical : Khim. prom. No 5, 257-260, Jul-Aug 1955

Abstract : Continues a discussion begun by M. M. Fedorovich in Khim. prom. No 2, 33, 1953 and No 2, 87, 1954. Expresses the view that the production capacity of plants should be estimated on the basis of the output of goods of high quality, i.e. of a quality which conforms with GOST standards. Four references, all USSR, all since 1940.

LAVRUKHINA, A.K.; MOSKALEVA, L.P.; MALYSHEV, V.A.; SATAROVA, L.M.; SU KHUN-GUY [Su Hung-Kuei]

Angular distribution of Na^{24} nuclei and fission fragments in the interaction of high energy protons with nuclei of gold and uranium. Zhur.eksp.i teor.fiz. no.3:994-995 Mr '60. (MIRA 13:7)

1. Institut geokhimii i analiticheskoy khimii Akademii nauk SSSR.
(Sodium--Isotopes) (Protons) (Nuclear reactions)

SOV/130-58-11-7/16

AUTHORS: ~~Malyshev, V.A., and~~ Gorbachev, A.F., Engineers, and Papush, A.G., Candidate of Technical Sciences

TITLE: Reduction of Metal Consumption in Casting Forging Ingots (Umen'sheniye rashkhoda metalla pri otlivke krupnykh kuznechnykh slitkov)

PERIODICAL: Metallurg, 1958, Nr 11, pp 16 - 18 (USSR)

ABSTRACT: In 1955 electric heating of hot-tops of large carbon and alloy steel ingots was advantageously adopted at the im. Il'icha (im. Il'ich) works. In 1957 the filling of hot tops was increased but further advantage was not obtained. The insulation of the hot top was improved by increasing the thickness of the refractory from 40 to 160 mm (Fig 1), the effectiveness of this being shown with ingots of nominal weights 38 and 54 tonnes of 60KhG and 55Kh steels. A third ingot of nominal weight 35.2 tonnes of type 55 steel was cast with the thickest refractory in but without electric heating of the hot top. The authors give details of these ingots (table) and show sulphur prints of the smaller ingots (Fig 2). Study of these has shown that in all the ingots the pipe, porosity and crude segregation were above the body of the ingot.

Card 1/2

SOV/130-58-11-7/16

Reduction of Metal Consumption in Casting Forging Ingots

Four further ingots were cast with electrical hot top heating: no effect of the changed hot-top configuration on stripping was observed. Joint tests with the Zhdanovskiy metallurgical institute showed that the quality of the metal had not suffered through the considerable reduction in the hot top volume.

There are 2 figures and 1 table.

Card 2/2

[illegible]

"[illegible]"

[illegible] presented at [illegible], sponsored by [illegible] 19[illegible].

APPROVED FOR RELEASE: 06/20/2000 CIA-RDP86-00513R001032010002-2"

MALYSHEV, V.D., kand. istoricheskikh nauk

The Lenin plan of the State Committee for the Electrification of Russia and how it was carried out. Trudy MADI no.26:40-69 '60. (MIRA 15:2)

(Electrification)

KLIMKOVICH, I.G., MALYSHEV, V.D.

Tracheobronchoscopy using anesthesia and muscle relaxants; preliminary report [with summary in English]. Khirurgiia 34 no.6:78-83 Je '58
(MIRA 11:8)

1. Iz 4-y kafedry klinicheskoy khirurgii (zav. - prof. V.I. Kazanskiy) TSentral'nogo instituta usovershenstvovaniya vrachey na baze TSentral'noy klinicheskoybol'nitsy (nach. V.N. Zakharchenko) Ministerva putey soobshcheniya.

(BRONCHOSCOPY, anesthesia & analgesia
anesth. with added musc. relaxants, technic & results (Rus))
(ANESTHESIA,
in bronchescopy, added use of musc. relaxants (Rus))
(MUSCLE RELAXANTS, therapeutic use
adjuvant in anesth. for bronchoscopy, technic & results (Rus))

MALYSHEV, V.D.

Hemodynamics in potentiated anesthesia. Akt. vop. obezbol. no.2: 48-62 '59. (MIRA 14:5)

1. Iz 4-y kafedry khirurgii (zav. - prof. V.I.Kazanskiy) TSentral'nogo instituta usovershenstvovaniya vrachey na baze TSentral'noy klinicheskoy bol'nitsy Ministerstva putey soobshcheniya (nachal'nik - zasluzhennyy vrach RSFSR V.N.Zakharchenko).

(ANESTHESIA) (BLOOD)

MAKARENKO, T.P., prof.; MALYSHEV, V.D.

Intra-arterial injection of blood as a method of controlling hemodynamic disorders in potentiated anesthesia. Akt. vop. obezbol. no.2:165-170 '59. (MIRA 14:5)

1. Iz 4-y kafedry khirurgii (zaveduyushchiy - prof. V.I.Kazanskiy) TSentral'nogo institute usovershenstvovaniya vrachey na baze TSentral'noy klinicheskoy bol'nitsy Ministerstva putey soobshcheniya (nachal'nik V.M.Zakharchenko).

(INJECTIONS, INTRA-ARTERIAL)
(BLOOD AS FOOD OR MEDICINE)
(ANESTHESIA—COMPLICATIONS AND SEQUELAE)
(BLOOD—CIRCULATION, DISORDERS OF)

MALYSHEV, V. D., CAND MED SCI, "~~MATERIAL~~ Data FOR the STUDY OF HEMODYNAMICS IN OPERATIONS UNDER VARIOUS FORMS OF ANESTHESIA." MOSCOW, 1960. (MIN OF HEALTH USSR, CENTRAL INST OF ADVANCED TRAINING OF PHYSICIANS). (KL, 2-61, 218).

MALYSHEV, V.D.

Hemodynamics in physical, mixed and chemical hypothermia. Nauch. rab. asp. i klin. ord. no.6:200-210 '60. (MIRA 14:12)

1. IV kafedra khirurgii (zav. prof. V.I.Kazanskiy) TSentral'nogo instituta usovershenstvovaniya vrachey.
(HYPOTHERMIA) (BLOOD--CIRCULATION)

MAKARENKO, T.P., prof.; MALYSHEV, V.D.

Features of hemodynamics during anesthesia. Khirurgiia 36 no.10: 107-112 0 '60. (MIRA 13:11)

1. Iz 3-y kafedry khirurgii (zav. - prof. V.I. Kazanskiy) TSentral'-nogo instituta usovershenstvovaniya vrachey na baze TSentral'noy klinicheskoy bol'nitsy Ministerstvo putey soobshcheniya (nach. - zasluzhennyy vrach RSFSR V.N. Zakharchenko).
(BLOOD—CIRCULATION) (ANESTHESIA)

MAKARENKO, T.P., prof.; SERGEVNIN, V.V.; MALYSHEV, V.D.

Principal problems of anesthesia in patients with functional disorders of the liver. Khirurgiia no.11:20-28 '61. (MIRA 14:12)

1. Iz 3-y kafedry khirurgii (zav. - prof. V.I. Kazanskiy) TSentral'nogo instituta usovershenstvovaniya vrachey na baze TSentral'noy klinicheskoy bol'nitsy (nach. - zasluzhennyy vrach RSFSR V.N. Zakharchenko) Ministerstva putey soobshcheniya.
(ANESTHESIA) (LIVER—DISEASES)

MALYSHEV, V.D.; SERGEVNIN, V.V.

Tracheostomy as an effective measure in controlling asphyxia caused by status asthmaticus. Vest.khir. 87 no.11:57-61 N '61. (MIRA 15:11)

1. Iz 3-y kafedry khirurgii (zav. - prof. V.I. Kazanskiy) TSentral'nogo instituta usovershenstvovaniya vrachey na baze TSentral'noy klinicheskoy bol'nitsy Ministerstva putey soobshcheniya.
(ASTHMA) (TRACHEA—SURGERY)

MALYSHEV, V.D., kand. med. nauk

Changes in external respiration depending on the type of anesthesia. Trudy TSIU 59:47-61 '63. (MIRA 17:9)

1. II kafedra khirurgii (zav.- prof. B.K. Osipov) TSentral'nogo instituta usovershenstvovaniya vrachey.

MALYSHEV, V.D., kand. med. nauk

Use of controlled and auxiliary respiration in treating acute respiratory insufficiency. Trudy TSIU 66:258-268 '64. (MIRA 18:5)

OSIPOV, B.K., prof.; MALYSHEV, V.D., kand. med. nauk; Y[illegible], [illegible], kand. med. nauk; GUTKINA, Z.I.; G[illegible]KOV, S.A.

Use of the artificial cough machine [illegible] in surgical practice. Khirurgiia 40 no.7:49-55 Jl '64. [illegible]

1. 2-ya kafedra klinicheskoy khirurgii (zav. - prof. B.K. Osipov), kafedra rentgenologii (zav. - prof. Yu.N. Sokolov) TSentral'nogo instituta usovershenstvovaniya vrachey i Vsesoyuznyy nauchno-issledovatel'skiy institut meditsinskiykh instrumentov i oborudovaniya (dir. - I.P. Smirnov), Moskva.

MALYSHEV, V.D., kand. med. nauk

[Controlled respiration in pulmonary surgery] Upravliaemoe dykhanie v khirurgii legkikh. Moskva, TSentr. in-t usovershenstvovaniia vrachei, 1965. 51 p. (MIRA 18:8)

YURKEVICH, V.M.; MALYSHEV, V.D.; SHVEDOVA, I.S.

Methodology of artificial pulmonary ventilation in thoracic surgery using a special adapter for double intubation tubuies. Nov. med. tekh. no.3:45-50 '65. (MIRA 19:1)

MALYSHEV, V. G.

Mal[illegible], V.G.

Discontinue simplifying electric power supply circuits. Zhel. dor. transp. no.3:26-[illegible] '57. (MIRA [illegible]:6)

1. Nachal'nik otdela energeticheskogo khozyaystva [illegible] otdeleniya Omskoy dorogi.

(Electric railroads)

MALYSHEV, V.G., inzh.; MAMONTOVSKIY, V.A., inzh.; PFUL', B.Ye., inzh., red.

[Machine for boring holes in frozen ground] Mashina dlia bureniia shpurov v merzlykh gruntakh; po materialam PKB Glavstroimekhanizatsii Ministerstva transportnogo stroitel'stva SSSR. Moskva, Gosstroiizdat, 1960. 6 p. (MIRA 14:11)

1. Akademiya stroitel'stva i arkhitektury SSSR. Institut organizatsii, mekhanizatsii i tekhnicheskoy pomoshchi stroitel'stvu.Byuro tekhnicheskoy informatsii. 2. Proyektno-konstruktorskoye byuro Glavnogo upravleniya po mekhanizatsii stroitel'nykh rabot Ministerstva transportnogo stroitel'stva SSSR (for Malyshev, Mamontovskiy).
(Boring machinery) (Frozen ground)

KANTOR, L.I.; MALYSHEV, V.G.

Machine for digging foundation pits for catenary poles.
Biul.tekh.-ekon.inform. no.7:56-59 '60.
(MIRA 13:7)
(Excavating machinery)

MALYSHEV, V.G., inzh.

Machine for digging foundation holes mounted on a platform car.
Mekh.stroi. 17 no.5:27-30 My '60. (MIRA 13:7)
(Excavating machinery)
(Electric lines--Poles)

MALYSHEV, V.G., inzh.

BTS-60 machine for boring holes in frozen ground. Stroi. i dor. mash. 6 no.10:25-26 O '61. (MIRA 14:10)
(Boring machinery)
(Frozen ground)

MALYSHEV, V.I.

Determination of coefficients of readiactive equilibrium as a method for studying the migration of uranium, ionium, and radium [with summary in English]. Sov.geol. 1 no.7:138-147 Jl '58. (MIRA 11:11)

1. Vsesoyuznyy institut mineral'nogo syr'ya.
(Radioactive substances)

MALYSHEV, V.I.

Mechanism for the displacement of a weight-control platform. Izm. tekh. no.10:22-26 O'60. (MIRA 13:10)
(Balance) (Electric controllers)

MALYSHEV, V.I.

Mechanism for the displacement of a weight-control platform. Izu.
tekh. no.10:27 O'60. (MIRA 13:10)
(Railroads--Equipment and supplies)

3

Ca

PROCESSES AND PROPERTIES INDEX

Rays of second order in the Raman spectra. G. S. Landsberg and V. I. Malyshev. *Compt. rend. acad. sci. U.R.S.S.* [N.S.] 3, 305-8(1936). The combinations and harmonics have been attributed from measurements of the weaker Raman lines of CCl_4 and $SnBr_4$. With the use as fundamentals for CCl_4 $A = 217$, $B = 313$, $C = 458$, $D_1 = 760$ and $D_2 = 775$ cm.$^{-1}$, the following combinations are reported: $2A$, $A + B$, $2B$, $2C$, $A + D_1$, $A + D_2$, $B + D_1$, $B + D_2$, $C + D_1$, $C + D_2$, $2D_1$, $D_1 + D_2$, $2D_2$, $C - B$. The fundamentals of $SnBr_4$ were taken as $A = 64$, $B = 88$, $C = 220$, $D = 279$ cm.$^{-1}$ and the following combinations are reported: $2A$, $2B$, $D - B$, $B + C$, $B + D$, $2C$, $C + D$. Within the limits of the accuracy of the measurements (± 3 cm.$^{-1}$) agreement is found between expt. and the calcd. combination. The intensity of these second-order rays is about 3×10^{-3} times that of 1st-order rays. Marked influence of temp. on the intensity of second-order rays has been noted in CCl_4 vapors at 250°. V. Deitz

ASB-SLA METALLURGICAL LITERATURE CLASSIFICATION

CA

MALYSHEV, V I

Expression of the results of chemical analyses of well waters and a method of analysis V. I. Malyshev *Azerbaidzhanskoe Neftyanoe Khoz.* 1938, No. 7-8, 15-17; *Khim. Referat. Zhur.* 2, No. 3, 79(1939). The alky. of water should be expressed in 4 components: bicarbonates, carbonates, org. acids and the borate compds. Only the gravimetric method can be used for the detn. of sulfates. All results of analyses must be converted to percentage by wt. W. R. Henn

METALLURGICAL LITERATURE CLASSIFICATION

3

Investigation of the frequency of the OH group in binary mixtures by means of combination dispersion. II. Combination spectrum of solutions of methanol in carbon tetrachloride and chloroform. V. I. Malyshev. *Compt. rend. acad. sci. U. R. S. S.* 20, 549-50(1938)(in English). — The frequency of the OH group in CH_3OH (I) in 1% soln. in CCl_4 is 3647 cm.$^{-1}$ as compared with the max. 3362 cm.$^{-1}$ for the wide band in pure I, and 3676 cm.$^{-1}$ for I in vapor; this points to the presence of isolated mols. of I in the soln. in CCl_4. With 5% I in CCl_4 a band (probably due to assocd. mols.) also is observed, which increases in intensity with the concn. of I in the soln. With 2% of I in $CHCl_3$ (ν = 3630 cm.$^{-1}$), with increase in the concn. of I the band also appears, but at high concns. only. Cf. Landsberg and Ukholin, *C. A.* 32, 2431[1]. George Avers

A S M - S L A METALLURGICAL LITERATURE CLASSIFICATION

Investigation of the frequency of the O H group in binary mixtures by the method of combination dispersion III. Combination spectra of solutions of methanol in benzene (I), chlorobenzene (II), fluorobenzene (IV), acetone (V), dioxane (VI), ethyl ether (VII), isoamyl ether (VIII), pyridine (IX) and piperidine (X). V. I. Malyshev. *Compt. rend. acad. sci. U. R. S. S.* **24**, 778-9(1939)(in English); cf. *C. A.* **33**, 3662[4]. An investigation of the dispersion spectra of 3.5, 5.0 and 10.0% alc. solns. in I gave a slight widening of the line ν = 3611 cm.$^{-1}$ and the authors conclude that the benzene mols. hinder the assocn. of MeOH more than did CCl_4. Lines for II were found at ν = 3630 cm.$^{-1}$, and bands were found in the 20% soln. The results for IV were analogous to those in II and the authors conclude that replacing Cl by F does not affect the oscillation of O-H in the MeOH mol. Expts. with bromobenzene were unsuccessful because of its intense decompn. by light. In V, a comparatively wide band was found at ν = 3532 cm.$^{-1}$, and the authors conclude that either because of the greater elec. moment or the pressure of an O atom, the oscillation of O-H was disturbed in a different manner from I-IV. Hence VI was used and a band appeared at ν = 3516 cm.$^{-1}$ (being double in the 2.0 and 3.5% solns.), with no bands for assocd. MeOH mols. VII gave a max. at ν = 3516 cm.$^{-1}$, analogously to VI. From expts. with VI, VII, VIII, the authors conclude that the O-atom and not the moment causes the disturbance of the oscillation of the O-H groups in alc. In IX and X, a max. was found at ν = 3400 cm.$^{-1}$ for IX, showing even more disturbance by the N atom than by the O atom. The authors conclude that the solvents can be divided into 2 groups; those with O and N, and those without, where the former cause an intense disturbance, which is attributed to the formation of a H-bond between the OH group of the alc. mol. and the O or N mol. of the solvent. Frank Gonet

3

CF

Diffusion by heavy water solutions. G. S. Landsberg, V. I. Malyshev and V. E. Solov'ev. *Compt. rend. acad. sci. U. R. S. S.* 24, 872-3(1939)(in French).—Solns. of D_2O in H_2O and acetone were studied spectrographically. The OD band was found to have a max. at $\nu = 2535$ cm^{-1} and a half width of 400 cm^{-1}, becoming narrower and displaced toward the higher frequencies (max. at ν = 2500 cm^{-1} and 200 cm^{-1} half width) in H_2O, and displaced farther and narrower (max. at ν = 2600 cm^{-1} and 130 cm^{-1} half width) in acetone. This shows that resonance effects play an important role in the perturbation phenomena of the (OD) and (OH) groups; the greater width of the OD band in water is attributed to the complicated structure of water, equiv. to a mixt. of 3 liquids at various mean intermol. distances. F. Gonet

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

3

CA

Intermolecular forces and Raman scattering V. I. Malyshev. *Bull. acad. sci. U. R. S. S., Ser. phys.* 4, 106-9(1940).—The method of Raman scattering permits measurement of the frequencies of intramol. oscillations, and consequently of the intramol. forces detg. these frequencies. If a mol. is subject to van der Waals forces, of the same order of magnitude as intramol. forces, their influence can be detected by study of the Raman-scattering spectra. The investigation of spectra of light scattered by solns. of CH_3OH in different solvents shows that, at small concn., the alc. mols. do not interact with one another, but interact only with the mols. of the solvent. The presence of an elec. moment in the solvent mols. affects only slightly the excitation of the O-H oscillations in the alc. mol. This is due to the fact that the moment of the solvent hampers the association of the alc. mols. The solvents whose mols. contain O and H atoms give considerable perturbation of the O-H oscillation and lead to the formation of hydrogen bond. Roksalana Gamow

Phys. Inst. AS USSR

METALLURGICAL LITERATURE CLASSIFICATION

CA

3

Studies of the intramolecular forces by the method of dispersion of light. V. I. Malyshev. *Bull. acad. sci. U. R. S. S., Ser. phys.* 5, No. 1, 13-18 (1941); *Khim. Referat. Zhur.* 4, No. 9, 6 (1941). –A review of the previous studies of M. and Ukholin on the effect of intramol. reaction (H bond) on the Raman spectra of OH-contg. substances (H_2O, MeOH and $HOCH_2CH_2Cl$ in various solvents). W. R. Henn

1ST AND 2ND ORDERS

PROCESSES AND PROPERTIES INDEX

CA

Spectroscopic determination of the heat of the hydrogen bond. V. I. Malyshev (Lebedev Phys. Inst.). *Bull. acad. sci. U.R.S.S., Sér. phys.* 9, No. 3, 198–200(1945) (in Russian). Raman spectra of CH_3OH in very dil. (1–2%) soln. in CCl_4 show a sharp line corresponding to the OH-group vibration at 3647 cm.$^{-1}$; very highly concd. solns. and the pure liquid show, instead of the line, a broad band with a max. at about 3370 cm.$^{-1}$. At intermediate concns. the line and the band coexist. The line is assumed to correspond to unassocd. CH_3OH mols., whereas the band is due to mols. assocd. into complex aggregates through hydrogen bonding. On Raman spectrograms of a 25% soln. of CH_3OH in CCl_4, taken at 25° and 65°, the relative intensities of the OH lines were measured and considered to be proportional to the numbers of unassocd. mols. in soln. at the two temps. The total no. of CH_3OH mols., including both the single and the assocd. mols., was taken to be proportional to the intensity of the CH line in the spectrum. With the aid of the simplifying assumptions that (1) all the complex aggregates are identical, and that (2) the dissocn. follows the uniform pattern $(CH_3OH)_n = CH_3OH + (CH_3OH)_{n-1}$, it is shown that as long as the degree of dissocn. remains low (which is the case in a 25% soln.), the ratio of the degrees of dissocn. at two temps. can be deduced from the ratios of the relative intensities of the OH line and of the CH line. From the dissocn. equil. at two neighboring temps., the value of the heat of dissocn. of the complex aggregates is calcd. by van't Hoff's relation. Its mean value is 13.0 kg.-cal./mole, which is very close to the 13.5 kg.-cal. given for the heat of dissocn. of gaseous AcOH mols. commonly regarded as hydrogen-bonded. It is concluded that CH_3-OH, in the pure liquid state and in concd. soln., also associates through hydrogen bonds. N. Thon

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

USSR/Chemistry - Hydrogen Bond
Chemistry - Dispersion

Jun 49

"Combination Dispersion of Light in Higher Alcohols and the Problem of the Hydrogen Bonds," V. I. Malyshev, Shishkina, Phys In st imeni P.N. Lebedev, Acad Sci USSR, 3 3/4pp

"Dok Ak Nauk SSSR" Vol LXIV, No 5

Studies combination dispersion spectra of ten monatomic alcohols from methyl to octyl alcohol for various temperatures. Tabulates results. Submitted by Acad G. S. Landsberg, 13 Apr 49.

PA 50/49T26

1ST AND 2ND ORDERS

PROCESSES AND PROPERTIES INDEX

Raman spectra of higher alcohols and the hydrogen *Doklady*
bond A. I. Malyshev and M. V. Shishkina The loosening
Akad. Nauk S.S.S.R. **66**, 853-6(1949). is expressed by
of the H bond in alcs. with rising temp. of an O–H line very
the appearance, at a higher temp., of an O–H line very
close to the O–H frequency in the gas phase, and in a
shift of the max. of the O–H band to higher frequencies.
The following data give, in cm.⁻¹, the frequency (and the
half width) of the max. of the band at 5° and at 75°,
further, at 75°, the intensity of the line, the ratio of its
intensity to that of the max. of the band, and the shift
of the latter between 5° and 75°. EtOH (I) 3371 (340)
and 3427 (380), 3632, very small, 56. PrOH (II) 3370
(300) and 3433 (315), 3631, 0.11, 63; BuOH (III) 3348
(300) and 3424 (315), 0.10, 76. $C_5H_{11}OH$ (IV) 3344 (300)
(290) and 3424 (315), 0.10, 76. $C_6H_{13}OH$ (V) 3332 (310)
and 3410 (335), 3632, 0.35, 66; $C_7H_{15}OH$ (VI) 333 (375)
and 3409 (350), 3639, 0.30, 77; Me_2CHCH_2OH (VII)
and 3432 (355), 3630, 0.54, 90; 2-methyl-2-
(280) and 3429 (410), 3633, 0.22, 60. 2-methyl-2-
butanol (VIII) 3343 (280) and 3415 (300), 0.30, 72. Me
$PrCHOH$ (IX) 3357 (260) and 3454 (270), 3624, 0.3,
97. In pure MeOH, the line does not appear even at 75°,
but does appear on diln. with CCl_4 to below 75°. At
5°, the line is absent or extremely weak in all alcs. As
judged by the intensities of the O–H line, the loosening
of the hydrogen bond is more marked in VII than in III,
and more marked in IX than in VIII. In the series of
normal alcs. I-VI, the loosening of the hydrogen bond in-
creases with the length of the chain. N. Thon

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

MALYSHEV, V. I.

PA 170T96

USSR/Physics - Spectroscopy Nov/Dec 50

"Methods for Increasing the Dispersion of the Spectral Apparatus," V. I. Malyshev, Phys Inst imeni Lebedev, Acad Sci USSR

"Iz Ak Nauk SSSR, Ser Fiz" Vol XIV, No 6, pp 746-752

Author was assisted in the experiments by I. I. Sobel'man, and was guided by advice of G. S. Landsberg. Describes method for triple passage of rays through prism of dispersive system.

170T96